



What is claimed is:

1. A spindle motor for use in a disk drive comprising a shaft supporting a thrust plate at one end thereof, a sleeve surrounding the shaft, and rotatable relative to the shaft and supporting a hub on the outer surface thereof, the sleeve having a surface adjacent the thrust plate and cooperating with the shaft to define a journal bearing and with the thrust plate to define a first fluid dynamic thrust bearing, a counterplate welded to an upraised axial shoulder of the sleeve and having a surface located adjacent a surface of the thrust plate to define at least a second fluid dynamic thrust bearing, fluid within the first and second thrust bearings and the journal bearing supporting relative rotation of shaft and sleeve, and a groove region defined in the shoulder of the sleeve radially aligned with adjacent the counterplate.
2. A spindle motor as claimed in claim 1 wherein the groove region extends at least part way axially into the radially inner portion of the sleeve shoulder.
3. A spindle motor as claimed in claim 2 wherein the groove additionally extends into the radially outer surface of the counterplate.
4. A spindle motor as claimed in claim 2 wherein the grooved region extends to about half the axially extent of the counterplate.
5. A spindle motor as claimed in claim 1 wherein the groove is cut into the radially outer surface of the sleeve arm in a region approximately parallel to or near to the gap between the counterplate and the thrust plate.
6. A spindle motor as claimed in claim 5 wherein the groove is as an axially extent which is approximately half the width or axial width of the counterplate.
7. A spindle motor as claimed in claim 1 wherein the groove extends axially down the radially outer surface of the sleeve arm.

8. A spindle motor as claimed in claim 7 wherein the groove has an axial extent equal to about half the axial depth of the counterplate.

9. A spindle motor as claimed in claim 1 wherein the groove extends radially away from the counterplate into the sleeve, and extends from a point near to the junction between the radial and axial walls of the sleeve wall approximately part way toward the upper axial surface of the arm.

10. A spindle motor as claimed in claim 9 wherein the groove is about half the axial width of the sleeve wall and about half the axial extent of the counterplate.

11. A spindle motor as claimed in claim 3 wherein the radially outer wall of the groove is tapered toward the radially outer wall of the shoulder.

12. A fluid dynamic bearing comprising a shaft supporting a thrust plate at one end thereof, a sleeve surrounding the shaft, and rotatable relative to the shaft and supporting a hub on the outer surface thereof, the sleeve having a surface adjacent the thrust plate and cooperating with the shaft to define a journal bearing and with the thrust plate to define a first fluid dynamic thrust bearing, a counterplate welded to an upraised axial wall of the sleeve and having a surface located adjacent a surface of the thrust plate to define at least a second fluid dynamic thrust bearing, fluid within the first and second thrust bearings and the journal bearing supporting relative rotation of the shaft and sleeve, and a groove defined in the arm of the sleeve radially adjacent the counterplate.

13. A bearing as claimed in claim 12 wherein the grooved region extends at least part way axially into the radially inner portion of the sleeve arm.

14. A spindle motor as claimed in claim 13 wherein the groove additionally extends along the radially outer surface of the counterplate.

15. A spindle motor as claimed in claim 12 wherein the groove extends axially down the radially outer surface of the sleeve arm.

16. A spindle motor as claimed in claim 15 wherein the groove has an axial extent equal to about half the axial depth of the counterplate.

17. A spindle motor as claimed in claim 12 wherein the groove extends radially away from the counterplate into the sleeve, and extends from a point near to the junction between the radial and axial walls of the sleeve wall approximately part way toward the upper axial surface of the arm.

18. A spindle motor as claimed in claim 17 wherein the groove is about half the axial width of the sleeve arm and about half the axial extent of the counterplate.

19. A spindle motor as claimed in claim 2 wherein the radially outer wall of the groove is tapered toward the radially outer wall of the shoulder.

20. A fluid dynamic bearing comprising a shaft supporting a thrust plate at one end thereof, a sleeve surrounding the shaft, and rotatable relative to the shaft and supporting a hub on the outer surface thereof, the sleeve having a surface adjacent the thrust plate and cooperating with the shaft to define a journal bearing and with the thrust plate to define a first fluid dynamic thrust bearing, a counterplate welded to an upraised axial shoulder of the sleeve and having a surface located adjacent a surface of the thrust plate to define at least a second fluid dynamic thrust bearing, fluid within the first and second thrust bearings and the journal bearing supporting relative rotation of shaft and sleeve, and means defined in the upraised wall for weakening the radial stiffness of the wall.